

**AMENDMENTS TO THE CLAIMS:**

The listing of claims will replace all prior versions, and listings of claims in the application:

**LISTING OF CLAIMS:**

1. (Currently Amended) A physical layer diagnostic system for a modular fieldbus board carrying two or more ~~number of~~ fieldbuses, the two or more fieldbuses each including a power supply converter and a power conditioner and the two or more fieldbuses connected to a bulk power supply via the power supply converter and power conditioner for each of the two or more fieldbuses, the system comprising a monitoring transceiver means connected in use to the two or more of the number of fieldbuses in which each connection to each of the two or more fieldbuses a fieldbus comprises two or more common mode and/or differential mode signal injection and/or signal detection points, which points are collectively formed to inject and/or detect both common mode and/or differential mode signals, and wherein first points of the common mode and/or differential mode signal injection and/or signal detection points are located between the bulk power supply and the power supply converter of each of the two or more fieldbuses and second points of the common mode and/or differential mode signal injection and/or signal detection points are located between the power conditioner which points are located between the bulk power supply and a fieldbus trunk part of each of the two or more fieldbuses the fieldbus, such that the monitoring transceiver means can detect one or more fieldbus physical layer characteristics between two of the two or more of said points, and in which the monitoring transceiver means is provided with a first digital and/or analog interface physically separate from the fieldbus trunk, and adapted to transmit physical layer diagnostic data detected by the monitoring transceiver means directly to an associated digital or analog device.

2. (Previously Presented) A diagnostic system as claimed in Claim 1 in which the fieldbus physical layer characteristics comprise one or more of: over/under

termination, noise/ripple level, signal level, signal bias, signal jitter, signal ringing, signal distortion, signal attenuation, cross talk, unbalance, and earth leakage.

3. (Currently Amended) A diagnostic system as claimed in Claim 1 in which the monitoring transceiver means also detects one or more characteristics of hardware carried on the modular fieldbus board by means of one or more of said points.

4. (Previously Presented) A diagnostic system as claimed in Claim 3 in which the one or more characteristics of hardware comprise one or more of: voltage, short circuit, hardware module failure, quiescent current, and rate of charge.

5. (Currently Amended) A diagnostic system as claimed in Claim 4 in which the monitoring transceiver means is adapted to gather received data and produce one or more of: Fourier analysis, trending analysis, and data logging.

6. (Currently Amended) A diagnostic system as claimed in Claim 1 in which the monitoring transceiver means is adapted to provide an alarm in the event that received data indicates one or more of pre-determined failures has occurred on any of the two or more fieldbuses, and in which the first digital and/or analog interface is adapted to transmit said alarm directly to an associated digital or analog device.

7. (Previously Presented) A diagnostic system as claimed in Claim 1 in which the first digital and/or analog interface is adapted to receive operating commands from an associated digital or analog device.

8. (Currently Amended) A diagnostic system as claimed in Claim 6 in which the monitoring transceiver means is provided with a second digital and/or an analog interface, such that diagnostic data detected and/or alarm created by the monitoring transceiver means during use are transmitted to other associated diagnostic systems.

9. (Currently Amended) A diagnostic system as claimed in Claim 6 in which the monitoring transceiver means is provided with visual means adapted to display diagnostic data detected and/or alarm created.

10. (Canceled)

11. (Currently Amended) A diagnostic system as claimed in Claim 1 in which the monitoring transceiver means is connected to the bulk power supply.

12. (Previously Presented) A diagnostic system as claimed in Claim 1 in which one or more of the two or more common mode and differential mode signal injection and/or signal detection points are disposed within hardware carried on the board.

13. (Currently Amended) A modular fieldbus board comprising a backplane;

~~a number of two or more fieldbuses mounted on the backplane, each fieldbus includes a connection to a bulk power supply, a power supply converter, a power supply conditioner and a fieldbus trunk~~  
the two or more fieldbuses each including a power supply converter and a power conditioner and the two or more fieldbuses connected to a bulk power supply via the power supply converter and power conditioner of each of the two or more fieldbuses, and

~~a monitoring transceiver means connected to the two or more of the number of fieldbuses by means of two or more common mode and/or differential mode signal injection and/or signal detection points, and wherein the two or more common mode and/or differential mode signal injection and/or signal detection points are interposed between and/or within the bulk power supply, the power supply converter, the power supply conditioner and the fieldbus trunk, such that the monitoring transceiver means can detect one or more fieldbus physical layer characteristics between two of the two or more of said two or more common mode and/or differential mode signal injection and/or signal detection points.~~

14. (Cancelled)

15. (Currently Amended) A modular fieldbus board as claimed in Claim 13 in which, on each of the one or more fieldbuses, a first common mode and/or differential mode signal injection and/or signal detection point is disposed between the bulk power supply and the power supply converter, ~~wherein~~ a second common mode and/or differential mode signal injection and/or signal detection point is disposed between the power supply converter and the power supply conditioner, ~~in which~~ a third common mode and/or differential signal injection and/or signal-detection point is disposed between the power supply conditioner and the fieldbus trunk, and a fourth common mode and/or differential mode signal injection and/or signal detection point is disposed between the third ~~common mode~~ and/or differential mode signal injection and/or signal detection point and the fieldbus trunk.

16. (Currently Amended) A modular fieldbus board as claimed in Claim 15 in which a ~~fourth~~ fifth common mode and/or differential mode signal injection and/or signal detection point is disposed within the power supply converter, and in which a ~~fifth~~ sixth common mode and/or differential mode signal injection and/or signal detection point is disposed within the power supply conditioner.

17. (Canceled)

18. (Currently Amended) A diagnostic system as claimed in ~~Claim 17~~ Claim 1 wherein, on each of the two or more fieldbuses, ~~a first common mode signal injection and/or signal detection point is disposed between the connection to the bulk power supply and the power supply converter, wherein a second~~ third common mode and/or differential mode signal injection and/or signal detection points ~~is~~ are disposed between the power supply converter and the power supply conditioners of each fieldbus, wherein ~~a third a common mode signal injection and/or signal detection point is disposed between the power supply conditioner and the fieldbus trunk, and wherein~~

~~a~~and ~~fourth common mode and/or~~ differential mode signal injection and/or signal detection point ~~is~~ points are disposed between the ~~third~~ second common mode signal injection and/or signal detection points and the fieldbus trunk.

19. (Currently Amended) A diagnostic system as claimed in Claim 18 in which a ~~fourth~~ fifth common mode signal injection and/or signal detection point ~~is~~ points are disposed within the power supply converter, and ~~in which a fifth~~ sixth common mode ~~and/or differential mode~~ signal injection and/or signal detection point ~~is~~ points are disposed within the power supply conditioner.

20. (Currently Amended) A modular fieldbus board comprising:  
a backplane;  
a bulk power supply;  
a plurality of fieldbuses, each fieldbus including a power supply converter, a power conditioner and a fieldbus trunk, mounted on the backplane, and each fieldbus is connected to the bulk power supply via each power supply converter of each of the plurality of fieldbuses;

two or more members selected from the group consisting of:  
common mode signal injection points,  
common mode signal detection points,  
differential mode signal injection points, and  
differential mode signal detection points,

connected to each of the plurality of fieldbuses, wherein the points are formed to inject and/or detect both common mode and differential mode signals to each of the plurality of fieldbuses, and wherein first points of the group of points are interposed between the bulk power supply and the power supply converter, and second points of the group of points are interposed between the power conditioner and the fieldbus trunk; and

a monitoring transceiver ~~means~~ connected to two or more of the plurality of fieldbuses by means of two or more of the group of signal injection and/or signal detection points, such that the monitoring transceiver ~~means~~ can detect one or more

fieldbus physical layer characteristics between two of the two or more of said points.

21. (Canceled)

22. (Currently Amended) The diagnostic system as claimed in claim 1 wherein the monitoring transceiver means is a segment autonomous diagnostic system.

23. (Currently Amended) A modular fieldbus board comprising two or more a number of fieldbuses, the two or more fieldbuses each including a power supply converter and a power conditioner and the two or more fieldbuses connected to a bulk power supply via the power supply converter and the power conditioner for each of the two or more fieldbuses connectable to use to a bulk power supply, the modular fieldbus board is provided with a diagnostic system comprising:

a monitoring transceiver means connected to ~~one~~ the two or more of the number of fieldbuses, in which each connection to a fieldbus comprises ~~one~~ two or more common mode and/or differential mode signal injection and/or signal detection points, which points are collectively formed to inject and/or detect both common mode and/or differential mode signals, and wherein first points of the common mode and/or differential mode signal injection and/or signal detection points are located between the bulk power supply and the power supply converter of each of the two or more fieldbuses and the second points of the common mode and/or differential mode signal injection and/or signal detection points are located between the power conditioner and a fieldbus trunk part of each of the two or more fieldbuses and one or more corresponding common mode and/or differential mode signal detection points, in which said points are dispersed between locations at which the fieldbus is connectable to the bulk power supply and to a fieldbus trunk, and in which the monitoring transceiver means is adapted to detect one or more fieldbus physical layer characteristics between any signal injection point and any signal detection point.

24. (New) A diagnostic system as claimed in claim 1, wherein the fieldbus is a two-wire system and each of the common mode and/or differential mode signal injection and/or signal detection points are connected to both wires of the two-wire fieldbus.